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FISH CATCH COMPOSITION IN RELATION TO SOME HYDROGRAPHIC OBSERVATIONS ALONG THE BOMBAY RATNAGIRI COAST

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ABSTRACT

Hydrographic parameters in relation to fish catch composition within the depth range of 30 m to 97 m at fifteen different stations off the Bombay to Ratnagiri coast were studied from onboard the vessel M.V. Saraswathi, a 36.5 meter deepsea going research-cum-training vessel during her 58th cruise from the 17th tothe 27th December 1986. The study indicates the abundance of *Trichiurus* sp, *Priacanthus* sp and *Arius* sp. The paper also reveals the fluctuations in the zooplankton biomass and faunistic composition in the area in relation to some important hydrographic parameters.

INTRODUCTION

Studies on the hydrography and plankton of the west coast of India have received considerable attention due to high productivity and fishery potential of this region. Many workers like Seshappa (1953), Desai and Krishnankutty (1967) and Goswami et al. (1977) have emphasised the influence of temperature, salinity, pH and dissolved oxygen on the distribution and abundance of plankton. However, studies relating to plankton and fisheries are meagre. This paper describes the fluctuations in the composition of zooplankton biomass of the area in relation to some important hydrographic parameters and with special reference to fisheries.

MATERIAL AND METHODS

Fifteen stations were selected along the latitude of 17°

TABLE 1 : DETAILS OF SAMPLE COLLECTION

Sr.No.	Latitude & Longitude	Position of the station	Depth (Mts.)	Date	Time (hrs.)	Disp. Vol. of zooplankton (ml)	Total fish catch (kg.)
1.	17° 35' 02" N 72° 53' 70" E	Off Dabhol	32	21.12.86	13.40	2.0	125
2.	17° 35' 00" N 72° 45' 00" E	Off Dabhol	37	21.12.86	14.40	5.6	1551
3.	17° 35' 00" N 72° 35' 78" E	Off Dabhol	48	21.12.86	17.30	3.6	575
4.	17° 35' 00" N 72° 22' 46" E	Off Dabhol	77	21.12.86	19.50	2.0	70
5.	17° 34' 99" N 72° 54' 01" E	Off Dabhol	97	22.12.86	12.20	2.4	2550
6.	17° 02' 72" N 72° 04' 80" E	Off Ratnagiri	95	23.12.86	9.15	2.8	10
7.	17° 05' 60" N 72° 31' 59" E	Off Ratnagiri	77	23.12.86	14.00	6.4	2015
8.	17° 05' 14" N 72° 45' 00" E	Off Ratnagiri	67	23.12.86	16.10	2.4	1260
9.	17° 05' 40" N 72° 55' 42" E	Off Ratnagiri	56	23.12.86	19.55	5.6	1238
10.	17° 05' 24" N 73° 02' 81" E	Off Ratnagiri	40	24.12.86	9.30	6.0	2565

11.	18° 00' 00" N 72° 45' 47" E	Off Srivardhan	30	25.12.86	7.15	2.0	100
12.	18° 06' 04" N 72° 37' 76" E	Off Srivardhan	40	25.12.86	11.15	6.0	43
13.	18° 05' 92" N 72° 25' 27" E	Off Srivardhan	37	25.12.86	15.15	1.2	110
14.	18° 08' 27" N 72° 16' 71" E	Off Srivardhan	50	25.12.86	17.45	3.2	60
15.	18° 05' 11" N 71° 55' 05" E	Off Srivardhan	83	26.12.86	7.20	1.6	90

35' and longitude of 72° 53' in the depth range of 30 to 97 meters. Water samples from three different depths, viz., surface, mid water and bottom were collected. Hydrographic studies were made for temperature, salinity, pH and dissolved oxygen following the standard methods (Strickland and Parsons, 1972). Zooplankton samples were collected using HT plankton net of 300 microns bolting silk and mouth opening of 0.25 m^2. Horizontal surface hauls of five minutes duration were made. Displacement volume was taken to estimate the zooplankton biomass. The gears used for fish catch were shrimp trawl and bottom trawl of 40 mm stretched mesh at the codend. The duration of hauls varied from 30 minutes to 2 hours. However, in majority of the cases it was restricted to one hour.

RESULTS AND DISCUSSION

Oceanographic studies : Table 1 gives the details of station position, time of collection, station depth etc. The variations in the fish catch and the productivity of water have been found to be associated with the variations in the different physico-chemical factors. The level of temperature, salinity and pH in the study area (Fig.1) indicated near optimum water quality. However, low values of dissolved oxygen were recorded from the bottom waters.

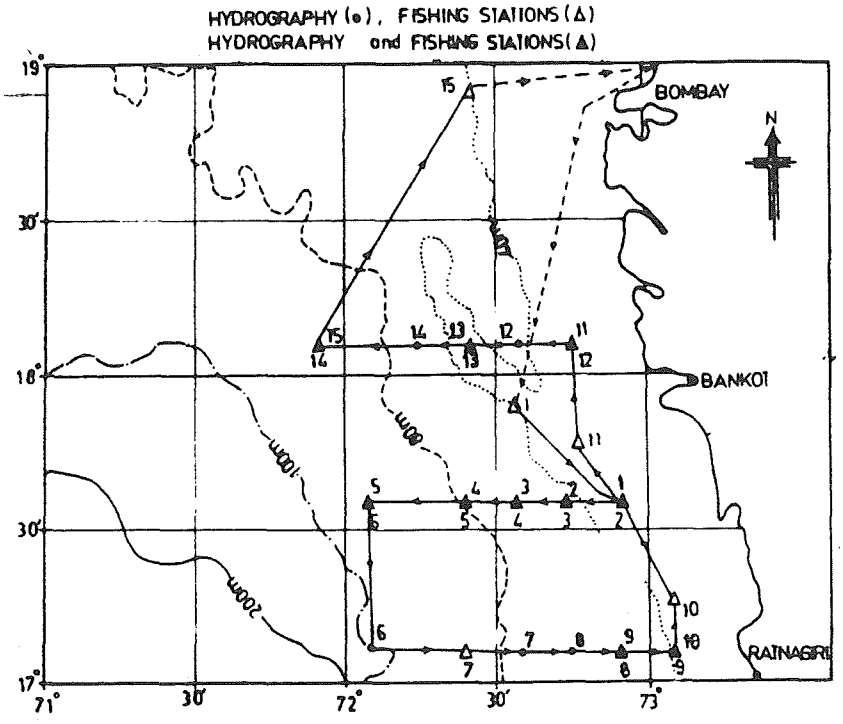

Fig.1 : Area surveyed and the sampling stations.(Cruise No.58)

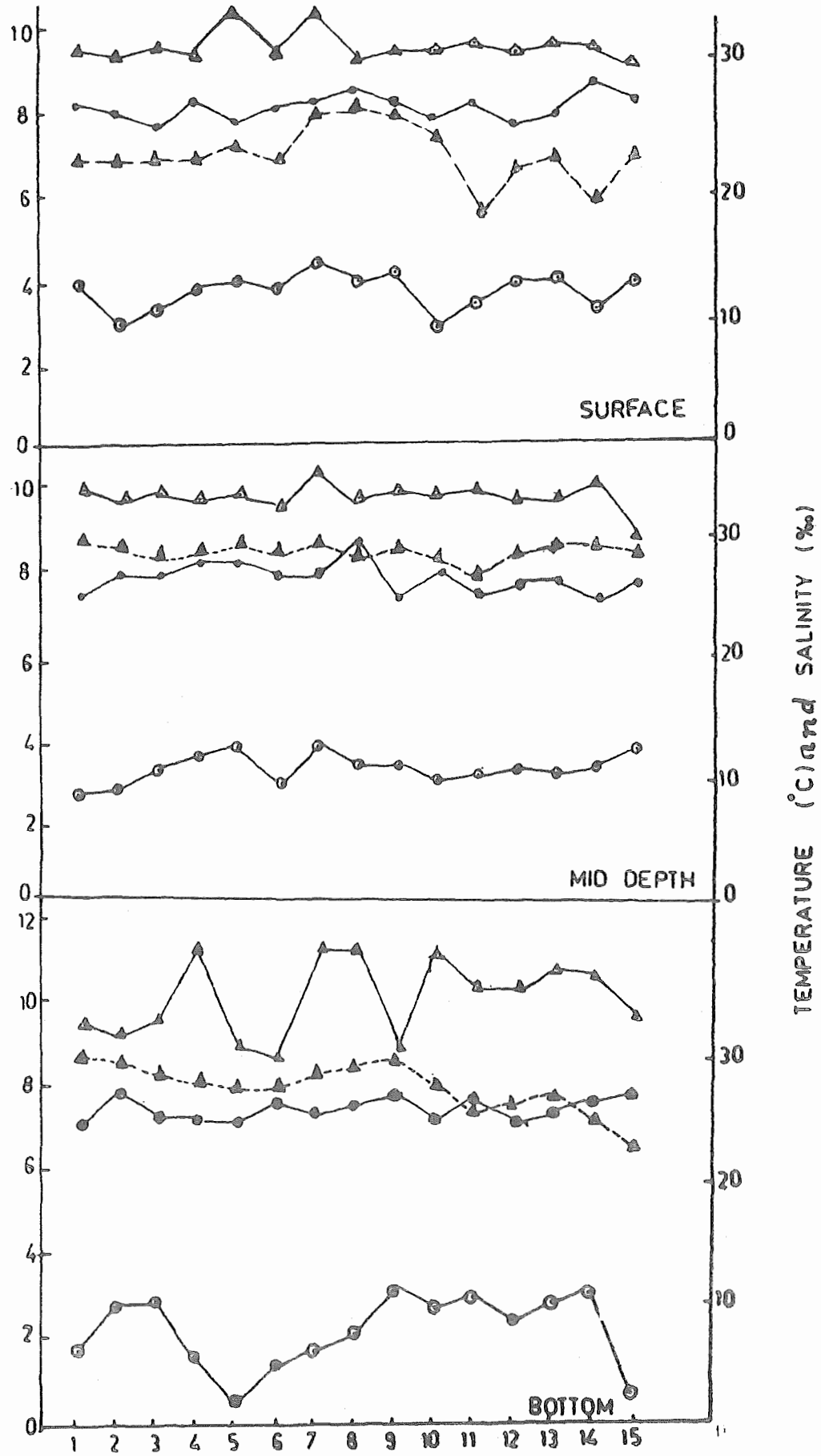

Fig.2 : Hydrographic parameters off Bombay-Ratnagiri coast. during December 1988 (Cruise No.58)

TABLE 2 : TOTAL NUMBER AND PERCENTAGE COMPOSITION OF ZOOPLANKTON

Sr.No.	Copepods	Chaeto-gnaths	Mysids	Salps & Dolio-lids	Appendi-cularians	Ostra-cods	Clado-cerans	Medusae	Echino-derm larvae	Crus-tacean eggs	Others	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	2128 (71.88)	608 (21.11)	64 (2.22)	-	-	-	-	-	-	-	80 (2.77)	2880
2.	18592 (96.19)	288 (1.49)	-	224 (1.15)	-	-	-	-	-	-	224 (1.15)	19328
3.	9536 (87.39)	384 (3.51)	-	320 (2.93)	320 (2.93)	-	-	-	-	-	352 (3.22)	10912
4.	1408 (38.93)	-	-	128 (3.5)	-	1648 (45.57)	496 (13.73)	-	-	-	64 (1.7)	3744
5.	1760 (24.89)	-	-	-	256 (3.62)	-	2432 (34.39)	-	2240 (31.67)	-	384 (5.43)	7072
6.	7760 (70.08)	128 (1.15)	-	-	192 (1.73)	112 (1.01)	96 (0.86)	-	-	2480 (22.39)	304 (2.74)	11072
7.	768 (40.67)	-	-	640 (33.89)	-	-	-	-	-	-	480 (25.42)	1888
8.	8480 (68.47)	448 (3.61)	320 (2.58)	-	-	2464 (19.89)	-	-	-	480 (3.87)	292 (1.55)	12384
9.	3040 (45.67)	128 (1.92)	-	3136 (47.11)	-	-	-	-	-	-	352 (5.28)	6656

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
10.	1440 (57.70)	416 (16.67)	-	352 (14.10)	-	-	-	-	-	-	258 (11.53)	2496
12.	5120 (65.04)	480 (6.09)	-	-	1056 (13.41)	832 (10.56)	-	-	-	-	334 (4.87)	7872
12.	1280 (54.79)	128 (5.47)	128 (5.47)	224 (9.58)	256 (10.95)	-	-	-	-	-	320 (13.69)	2336
13.	2560 (88.39)	96 (3.31)	80 (2.27)	-	64 (2.20)	-	-	-	-	-	96 (3.31)	2896
14.	1696 (68.83)	256 (10.38)	-	-	288 (11.68)	-	96 (3.8)	-	-	-	228 (5.19)	2464
15.	1344 (64.12)	160 (7.63)	48 (2.29)	64 (3.05)	256 (12.21)	-	-	80 (3.81)	-	-	150 (7.63)	2112

The surface temperature varied from 25 to 28° C. The lowest temperature of 25°C was recorded at station 11 and the highest of 28°C at station 8 (fig.2). The mid depth water temperature varied from 25.2 to 28°C. The lowest mid depth temperature of 25.2°C was also observed at station 11 and the highest temperature of 28°C at station 2. The bottom water temperature varied from 21.6 to 26.2°C at the depth of 83 m and 56 m respectively at station 15 and 9. Dissolved oxygen varied from 3.27 to 4.25 ml/l at the surface, from 2.91 to 4.03 ml/l at the mid depth and from 0.53 to 3.13 ml/l at the bottom. The lowest and the highest dissolved oxygen level of 0.53 and 4.25 ml/l was recorded at the depth of 97 and 77 m at stations 5 and 7. There was a sudden fall in the dissolved oxygen concentration in the bottom below a depth of 65 meters. The salinity ranged from 28.7 to 35.14 o/oo at the surface, 30.0 to 35.80 % o at the mid depth and 31.60 to 35.80 %o at the bottom. The pH level at the surface water varied from 7.70 to 8.40, from 7.60 to 8.40 at the mid depth while at the bottom it varied from 7.40 to 8.40 (Fig.2.)

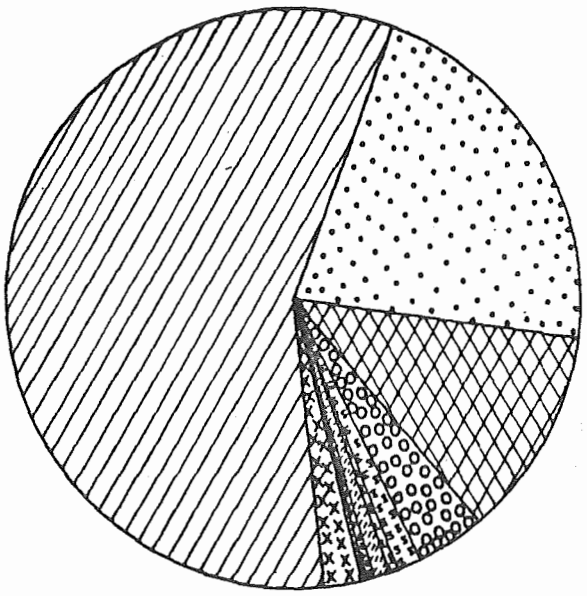

Fig.3 : Percentage contribution of different species in the total catch landed during the cruise.

TABLE 3 : STATIONWISE FISH CATCH COMPOSITION (IN KG.)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Loligo duvaucelli	10	-	-	-	5	-	--	-	58	-	-	10	-	-	-	83
Arius sp.	50	20	25	30	-	-	-	150	30	1000	90	10	100	-	-	83
Trichiurus sp.	40	1500	500	10	2500	10	-	1000	80	1500	-	-	5	-	-	7145
Coilia dussumieri	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	20
Scoliodon sp.	20	-	-	-	-	-	-	100	40	30	-	-	-	-	20	210
Priacanthus sp.	-	-	-	-	-	-	2000	-	500	5	-	-	-	40	-	2545
Megalopsis sp.	-	-	-	-	-	-	-	-	500	-	-	-	-	-	-	500
Pampus argenteus	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	20
Miscellaneous	5	31	30	30	45	-	15	10	30	30	20	23	5	-	65	339
Total ...	125	1551	575	70	2550	10	2015	1260	1238	2565	100	43	110	60	90	12362

Zooplankton : Total zooplankton and the biomass as estimated by displacement volume from 15 different stations are given in tables 2 and 1. On the basis of plankton volume obtained, the productivity of the area is categorised into the following three groups :

a. High productive area having a plankton biomass of over 5 ml. (stations 2, 7, 9, 10 and 12).

b. Low productive area having a plankton biomass of less than 3 ml. (stations 1, 4, 5, 6, 8, 11, 13 and 15)

c. Medium productive area having a plankton biomass of 3 to 5 ml. (stations 3 and 14)

Table 2 gives the percentage and total number of different zooplanktonic groups for all the stations. Fish eggs and larvae constituted less than 2% in the total zooplankton. Appendicularian salps and doliolids were well represented in the sample when the salinity was high. Chaetognath was fairly abundant in almost all the stations with the maximum numbers observed at stations 1, 8, 10 and 11 while the maximum number of copepods and salps were found at stations 2 and 9.

Fishery Potential : Bottom trawling was conducted at fifteen stations to assess the fishery potential and the catch composition of the area. The total catch during this cruise was 12,362 kg (Table 3). The highest catch was in 17° 05' area where about 2565 kg catch was obtained. The catch mainly composed of ten species besides some miscellaneous ones. *Trichiurus* was the most dominant species contributing almost 57.4% of the total catch while *Priacanthus* sp (20.45%), *Arius* sp (12.05%) and *Megalapsis cordyla* (4.02%) were the other important species in the catch (Fig.3). The highest catch was obtained at stations 2, 5, 7, 8, 9 and 10.

The influence of temperature, salinity, pH and dissolved oxygen on the distribution and abundance of plankton has been emphasized by many earlier workers There was little difference in temperature and salinity at the different sampling stations. The fluctuations in temperature follow the trend in atmospheric temperature changes.

Dissolved oxygen is one of the most important parameters in water quality assessment and reflects on the physical and biological processes prevailing in the water. Nonpolluted surface waters are normally saturated with dissolved oxygen.

At 40m and 97m depths, the catch was maximum (2565 and 2550 Kg) off Ratnagiri and Dabhol. However, there was no significant correlation between the surface zooplankton and the demersal fish catch.

In the present study, the observed zooplankton production was relatively higher at stations 2, 7, 9, 10 and 12 whereas at stations 13 and 15 the productivity was very poor. Josanto and Sarma (1985) reported that low concentration of oxygen was associated with low diversity of fish larvae. In the present study, low dissolved oxygen values were recorded from the bottom waters at station 5 and 15. Though the fish catch was low at station 15 (90 kg), higher catch (2550 kg) was recorded at station 5 where 98% of the catch was dominated by *Trichiurus* sp indicating the adaptability of this species to low oxygen. Little variation was observed in the temperature values between the stations without any significant relationship between the temperature and fish catch.

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